

CLAIMS

What is claimed is:

1 1. A method comprising predicting when to generate a bus request based
2 on bus-usage efficiency and bus-bandwidth usage.

1 2. The method of claim 1 further comprising:
2 generating a bus-usage efficiency indicator by a requestor based on
3 unused bus cycles that were granted to the requestor; and
4 generating a bus-bandwidth usage indicator by the requestor based on a
5 number of bus transactions utilized by the requestor.

1 3. The method of claim 1 further comprising generating the bus request
2 ahead-of-time based on the predicting.

1 4. The method of claim 3 further comprising receiving a bus-activity
2 indicator from a bus arbiter indicating system bus activity during a prior system-
3 bus observation window, and
4 wherein predicting further comprises predicting when to generate the bus
5 request ahead-of-time based on the bus-activity indicator.

1 5. The method of claim 4 wherein when the bus-activity indicator
2 indicates that the system bus is not busy, the method further comprises engaging
3 in full speculation to generate the bus request ahead-of-time at a maximum
4 predetermined number of bus cycles.

1 6. The method of claim 4 wherein when the bus-activity indicator
2 indicates that the system bus is busy, predicting comprises predicting how early
3 to generate the bus request ahead-of-time based on the bus-activity indicator, a
4 bus-usage efficiency indicator and a bus-bandwidth usage indicator.

1 7. The method of claim 6 wherein predicting further comprises predicting
2 when to generate the bus request based on one of a plurality of speculation states
3 at least initially determined by the bus-activity indicator, and the method further
4 comprises transitioning among the speculation states based on the bus-usage
5 efficiency indicator and the bus-bandwidth usage indicator.

1 8. The method of claim 4 wherein generating further comprises
2 generating the bus request a number of bus cycles ahead-of-time based on an
3 imminence level of a transaction for the bus request.

1 9. The method of claim 1 wherein at least one of a plurality of requestors
2 generate bus requests ahead-of-time based on the predicting, wherein the
3 requestors comprise one or more of a memory controller, a direct memory access
4 unit, a network interface, a digital signal processors, a network controller a
5 wireless local area network controller, a signal processor, a floating-point unit,
6 an application accelerators, or a data acquisition device.

1 10. The method of claim 4 wherein the bus-activity indicator is generated
2 by a bus arbiter and indicates whether or not the system bus is busy based on a
3 number or requests during a system-bus observation window, the system-bus
4 observation window comprising a prior predetermined number of system-bus
5 cycles.

1 11. The method of claim 4 wherein the bus-activity indicator is generated
2 by a bus arbiter and comprises a two-bit value broadcasted by the bus arbiter to
3 one or more requestors of the system.

1 12. A memory controller comprising:
2 first logic circuitry to generate a bus-usage efficiency indicator and a bus-
3 bandwidth usage indicator; and
4 second logic circuitry to predict when to generate a bus request based on
5 the bus-usage efficiency indicator and the bus-bandwidth usage indicator.

1 13. The memory controller of claim 12 wherein the first logic circuitry
2 generates the bus-usage efficiency indicator based on unused bus cycles that
3 were granted to the memory controller during a prior observation window, and
4 generates the bus-bandwidth usage indicator based on a number of bus
5 transactions utilized by the memory controller during the prior observation
6 window.

1 14. The memory controller of claim 13 further comprising third logic
2 circuitry to generate the bus request ahead-of-time based on the prediction.

1 15. The memory controller of claim 14 wherein the second logic circuitry
2 receives a bus-activity indicator from a bus arbiter indicating system bus activity
3 during a system-bus observation window and predicts when to generate the bus
4 request ahead-of-time based on the bus-activity indicator.

1 16. The memory controller of claim 15 wherein when the bus-activity
2 indicator indicates that the system bus is not busy, the memory controller
3 engages in full speculation and generates the bus request ahead-of-time by a
4 maximum predetermined number of bus cycles.

1 17. The memory controller of claim 15 wherein when the bus-activity
2 indicator indicates that the system bus is busy, the second logic circuitry predicts
3 how early to generate the bus request based on the bus-activity indicator, the bus-
4 usage efficiency indicator and the bus-bandwidth usage indicator.

1 18. The memory controller of claim 17 wherein the second logic circuitry
2 predicts when to generate the bus request based on one of a plurality of
3 speculation states at least initially determined by the bus-activity indicator, the
4 memory controller to transition among the speculation states based on the bus-
5 usage efficiency indicator and the bus-bandwidth usage indicator.

1 19. The memory controller of claim 15 wherein the second logic circuitry
2 determines a number of bus cycles to generate the bus request ahead-of-time

3 further based on an imminence level of a transaction for which the bus request is
4 to be generated.

1 20. A processing system comprising:
2 an arbiter to generate a bus-activity indicator indicating activity of a
3 system bus activity during a prior system-bus observation window;
4 a memory controller to predict when to generate a bus request based on
5 the bus-activity indicator, a bus-usage efficiency indicator and a bus-bandwidth
6 usage indicator and to generate the bus request ahead-of-time based on the
7 prediction; and
8 synchronous memory coupled to the memory controller.

1 21. The processing system of claim 20 wherein the memory controller
2 generates the bus-usage efficiency indicator based on unused bus cycles that
3 were granted to the memory controller, and generates the bus-bandwidth usage
4 indicator based bus transactions utilized by the memory controller during a prior
5 observation window.

1 22. The processing system of claim 21 wherein when the bus-activity
2 indicator indicates that the system bus is not busy, the memory controller
3 engages in full speculation to generate the bus request ahead-of-time at a
4 maximum predetermined number of bus cycles, and
5 wherein when the bus-activity indicator indicates that the system bus is
6 busy, the memory controller predicts how early to generate the bus request based
7 on the bus-activity indicator, the bus-usage efficiency indicator and the bus-
8 bandwidth usage indicator.

1 23. The processing system of claim 22 wherein the memory controller
2 predicts when to generate the bus request based on one of a plurality of
3 speculation states at least initially determined by the bus-activity indicator, the
4 memory controller transitions among the speculation states based on the bus-
5 usage efficiency indicator and the bus-bandwidth usage indicator.

1 24. A wireless communication device comprising:
2 a wireless network interface to provide wireless communications within a
3 wireless network, the network interface coupled to a system bus; and
4 a requestor to predict when to generate a bus request for use of the system
5 bus based on a bus-activity indicator, a bus-usage efficiency indicator and a bus-
6 bandwidth usage indicator and to generate the bus request ahead-of-time based
7 on the prediction.

1 25. The device of claim 24 further comprising an antenna coupled to the
2 network interface to receive and transmit the wireless communications with the
3 network, and
4 wherein the requestor generates the bus-usage efficiency indicator based
5 on unused bus cycles that were granted to the requestor, and generates the bus-
6 bandwidth usage indicator based bus transactions utilized by the requestor during
7 a prior observation window,
8 wherein the device further comprises an arbiter to generate the bus-
9 activity indicator indicating activity of the system bus activity during a prior
10 system-bus observation window.

1 26. The device of claim 25 wherein when the bus-activity indicator
2 indicates that the system bus is not busy, the requestor engages in full
3 speculation to generate the bus request ahead-of-time at a maximum
4 predetermined number of bus cycles,
5 wherein when the bus-activity indicator indicates that the system bus is
6 busy, the requestor predicts how early to generate the bus request based on the
7 bus-activity indicator, the bus-usage efficiency indicator and the bus-bandwidth
8 usage indicator, and
9 wherein the requestor predicts when to generate the bus request based on
10 one of a plurality of speculation states at least initially determined by the bus-
11 activity indicator, the requestor transitions among the speculation states based on
12 the bus-usage efficiency indicator and the bus-bandwidth usage indicator.

1 27. The device of claim 25 wherein the requestor and the wireless
2 network interface are two of a plurality of requestors desiring access to one or
3 more shared resources,
4 wherein the wireless network interface predicts when to generate a bus
5 request based on the bus-activity indicator, a bus-usage efficiency indicator and a
6 bus-bandwidth usage indicator, and
7 wherein the wireless network interface generates the bus request ahead-
8 of-time based on the prediction.

1 28. An article comprising a storage medium having stored thereon
2 instructions, that when executed by a computing platform, result in predicting
3 when to generate a bus request based on bus-usage efficiency and bus-bandwidth
4 usage.

1 29. The article of claim 28 wherein the instructions, when further
2 executed by the computing platform result in:
3 generating a bus-usage efficiency indicator by a requestor based on
4 unused bus cycles that were granted to the requestor; and
5 generating a bus-bandwidth usage indicator by the requestor based on a
6 number of bus transactions utilized by the requestor.

1 30. The article of claim 29 wherein the instructions, when further
2 executed by the computing platform result in:
3 receiving a bus-activity indicator from a bus arbiter indicating system
4 bus activity during a prior system-bus observation window, and
5 wherein predicting further comprises predicting when to generate the bus
6 request ahead-of-time based on the bus-activity indicator,
7 wherein when the bus-activity indicator indicates that the system bus is
8 not busy, the instructions result in engaging in full speculation to generate the
9 bus request ahead-of-time at a maximum predetermined number of bus cycles.